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ABSTRACT

This study on behavior modification training examined the effect of frequent feedback to reinforce a teacher's attending to appropriate child behaviors. Two Head Start teachers were selected as subjects. Baseline observations, training, and posttest observations were made of both teachers. Training involved feedback to the teachers every 10 minutes on the appropriateness of their reinforcing techniques. Data from observations indicated that feedback was an important factor in modifying the behavior of the teachers. In addition, teachers were equipped with hearing-aid type receivers, so that they could receive immediate and continual feedback. The dependent measure of this phase of the study was the behavior of the children the teacher was attempting to help. The desired teacher behaviors and student behaviors increased greatly. One of the teachers generalized to the entire class the lessons she had been taught for a specific target child. Measurement of teacher effectiveness through measurement of child behaviors appears worthy of further exploration. (MH)

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TECHNICAL REPORT

RESEARCH

Report No. 19

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UNIVERSITY OF KANSAS

HEAD START EVALUATION AND RESEARCH CENTER

University of Kansas, Lawrence, Kansas

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THE MODIFICATION OF TEACHER BEHAVIORS WHICH MODIFY CHILD BEHAVIORS

Carolyn L. Thomson and Margaret L. Cooper[1,2]
Head Teachers and Instructors
The Edna A. Hill Child Development Preschool Laboratories

Department of Human Development
The University of Kansas
Lawrence, Kansas 66044

Teacher training has traditionally included formal study followed by an apprenticeship experience. Techniques that have been a part of such training have been varied: reading and writing assignments preceding and/or concurrent with the apprenticeship, observations of particular children, demonstration teaching by a model teacher, and regular conferences with a supervising teacher about teacher performance and the events of the sessions.

More recently, educators have been exploring the possibilities of video tape by replaying it for class discussion or for analysis by the student teacher. Likewise, closed-circuit television provides the immediate utilization of demonstrated teaching techniques. Another procedure for training teachers under current exploration is the use of feedback to the student teacher about her performance at the time of that performance.

Behavior modification research has demonstrated the effectiveness of adult social attention in increasing social interaction rates of young children (Allen, 1964, Baer, 1967, Buell, 1968, Harris, 1964, Hart, 1964 and 1968). The research, designed to examine systematically the conditions under which change in behavior occurred, indicates that the elements of teacher attention responsible for changes are her priming and reinforcing behaviors.

In these studies, teachers have timed their interactions with children to make teacher attention contingent on the responses they want from children. For example, teachers smile, move near, converse, or bring out additional materials contingent on a child interacting with another child. Thus, they reinforce the social behavior. For children who have low rates of interaction and emit so few responses that making contact with the contingencies is rare, teachers set up situations to prompt social interaction. They create a place for one more child on the train or boat, suggest where one child might help another or give a child tickets to distribute for admission to a "train ride." Thus, they prime the social behavior. In these ways, the teacher not only provides pleasant consequences contingent on what happens; they also become discriminative stimuli for pleasant things to happen.

How do we train teachers to use these techniques? Following procedures similar to those used in modifying child behavior, Margaret Cooper and I examined the effect of frequent feedback to reinforce a teacher's attending to appropriate child behaviors. Two teachers of comparable Head Start groups were selected as subjects. The general procedure for both teachers included conditions of baseline observation, training to attend to specific child responses, and a posttest observation of probe. Teacher attending was recorded as such whenever she responded to a child who was involved in an activity, following directions, involved in group play or had initiated adult interaction.

The training condition contained two phases of feedback to the teacher. In Phase 1, at the end of each ten minute interval, the teacher was given the number of appropriate child responses she had attended to during those ten minutes. In Phase 2, an additional form of feedback was included -- the number of appropriate child responses she had not attended to. Then, after training was completed, a probe condition recorded the teacher's attending behavior under conditions similar to baseline to examine the durability of any training effects.

INSERT FIGURE 1 ABOUT HERE

The first figure shows the rate of teacher attending to appropriate behavior throughout the study. Both teacher A (the black line) and teacher B (the white line) started their baseline conditions simultaneously. After eight days, Phase 1 of training began for teacher A. But for teacher B, baseline conditions were continued with the addition of an irrelevant conversation at the end of each ten minute interval (marked by an asterisk in the figure). This equated social interaction between the trainer and each teacher, to see if merely social interaction (devoid of training) would have any effect upon teacher B's behavior. After eight training days, Phase 2 of the training began for teacher A. After four days of this additional information, a fading procedure began: feedback was discontinued at the end of each ten minute interval; instead, it was given as a cumulative total at the end of each day. Then, on the 26th day, the trainer left early, thus giving no information at all during that day, and ending the training period. One week later an observer recorded attending behavior for a probe of four days.

Teacher B underwent a similar sequence, but starting later than teacher A. After 18 days of baseline, Phase 1 of her training condition began. Then Phase 2 feedback was included, as it had been for teacher A. Finally, after her training had ended, a one-week probe was made.

As the figure shows, teacher A made the most dramatic progress under training, with immediate increases at the onsets of both Phase 1 and Phase 2.

teacher B's attending to appropriate behavior increased by one-third of her baseline rate in Phase 1, and by an additional one-third in Phase 2. But during the irrelevant feedback portion of baseline, there was little change in B's attending rate. Clearly enough then, feedback was a factor in changing the behaviors of teachers A and B.

Under traditional training procedures, the measure of a student-teacher's performance often has been simply the satisfaction of her supervising teacher. But in that case, the exact criteria for measurement are not available. It may be that the student can adjust to the supervisor's criteria without having those criteria specified in objectively defined terms. However, the assessment of student-teacher performance by directly measuring the behavior of children under the student-teacher's guidance could provide a means of specifying criteria for effective teacher skills.

The effect of feedback as a reinforcement procedure showed that positive changes occurred in teacher behavior. It also raised two questions. If feedback at ten-minute intervals was instrumental in changing teacher behavior, would not feedback at the time the behavior was emitted be even more effective in changing teacher behavior? And if a teacher's behavior is altered, would it not be desirable to measure the effects of her altered behavior by measuring the behavior of the children she interacts with? To answer the first question of immediate feedback, research was designed to use a radio system which allowed the supervisor to listen and talk directly to the student-teacher. To accomplish that, the student-teacher wore a hearing aid known as a "bug" in her ear, and through it heard comments from her supervisor. Thus, immediate feedback was possible. To measure child behavior as a function of student-teacher behavior, two observers were employed -- one to record the behavior of the student-teacher and the other to record the behavior of a particular child, referred to as the target child.

As part of their general training both student-teachers met weekly with their supervising teacher. This time included discussion of data, reading assignments, written plans for activities, various aspects of working with particular children and general student responses to the preschool activities. There was also opportunity for appropriate discussion both before and after the daily session.

Early in the semester, each student-teacher was assigned to a target child -- a child with a low rate of peer interaction. Her task was to facilitate and maintain increased peer interaction for him. The child's observer recorded two categories of child behavior: peer interaction and adult interaction. The teacher's observer recorded three categories of teacher behavior: interaction with children, priming, and attention contingent on social interaction between children.

INSERT FIGURE 2 ABOUT HERE

The second figure shows the student-teacher's combined rates of all attention to her target child and to all other children, against a graph of her target child's peer interaction rate. After baseline period, teacher 1 was presented with her task: to help her target child, Roy, develop social skill with peers. She was to rely on her own efforts. This resulted in a doubling of teacher 1's attention to Roy, but a decrease in Roy's peer interaction. Probably, the increased teacher attention to Roy was so poorly focused as to actually prevent both Roy and teacher 1 from interacting with other children. At any rate, it was not effective in developing Roy's social skill with his peers. The "bug" was then used to prompt teacher 1 to prime Roy into social interaction, and then to give attention to him contingent upon that social interaction. This procedure resulted in her giving three times more attention to Roy and fifty percent more attention to other children. At the same time, Roy's peer interactions soared to more than double his rate during baseline. When the procedure was discontinued during the probe condition, teacher 1's attention to Roy decreased to the rate she had shown during her "Own Efforts" condition; and Roy's peer interaction decreased by one-third his "bugged" rate. During the second period of training with the "bug" teacher 1's rate of attention to Roy was four times greater than her previous probe rate, and though Roy's peer interaction increased only slightly it was considerably higher than baseline and own efforts rates. The high rate of teacher 1's attention and Roy's decrease in peer interaction in the third training period, and teacher 1's decreasing attention to Roy and Roy's increased social interaction rate during the remaining two probe periods, suggest that at this point the training procedure had become an interfering factor and that teacher 1 was now more effective using her own efforts to attend to Roy.

INSERT FIGURE 3 ABOUT HERE

In a concurrent study, the "bug" was applied to the separate training of priming and reinforcing as teacher techniques with a second student-teacher. The third figure shows the course of these behaviors, together with the pertinent behavior of a target child. After a period of baseline, the "bug" was used to prompt teacher 2 to prime her target child, Dave, into peer interaction. This resulted in a clear increase of teacher 2's priming behavior and a clear increase in Dave's peer interaction. Following this procedure, the "bug" was then used to prompt teacher 2 into attending to Dave when he was interacting with peers so as to reinforce that peer interaction. This resulted in clear increases in the critical behaviors for both teacher 2 and Dave. Finally, when training with the "bug" emphasized teacher 2's priming and reinforcing behaviors to all children, she continued to maintain her rates of behavior to Dave.

For both teacher 1 and teacher 2, the desired behaviors increased under conditions of immediate feedback. The target children in both experiments displayed a higher rate of interacting with peers during the

teacher's training conditions than during baseline conditions. Immediate feedback as a training technique appears to have been effective in increasing specified behaviors in both teachers. Teacher 1's case points out that the traditional method of training teachers, involving assignments, conferences, and discussions, does change behavior. However, addition of the "bug" resulted in even more dramatic change. Teacher 1's case also suggests that the "bug" had immediate value in the initial establishment of a particular behavior at critical times, but also, that if it is not used judiciously, it could become an interfering factor in the development of that skill. Teacher 2 also shows the generalization of her skills to other children in the classroom in the next figure.

INSERT FIGURE 4 ABOUT HERE

This figure shows her priming and reinforcing of other children through the stages of her training. She generalized rather well the lessons she had been taught specifically for Dave, and improved still more when her training was directed specifically to all other children.

For both teachers' training, the time devoted to their use of immediate feedback was twenty minutes a day -- a negligible time loss to the entire program. Both teachers show that an objective measurement of child behavior does reflect objectively measured teacher behavior. Thus, measurement of teacher effectiveness through measurement of her children's behavior appears to be a technique worthy of further exploration.

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FOOTNOTES

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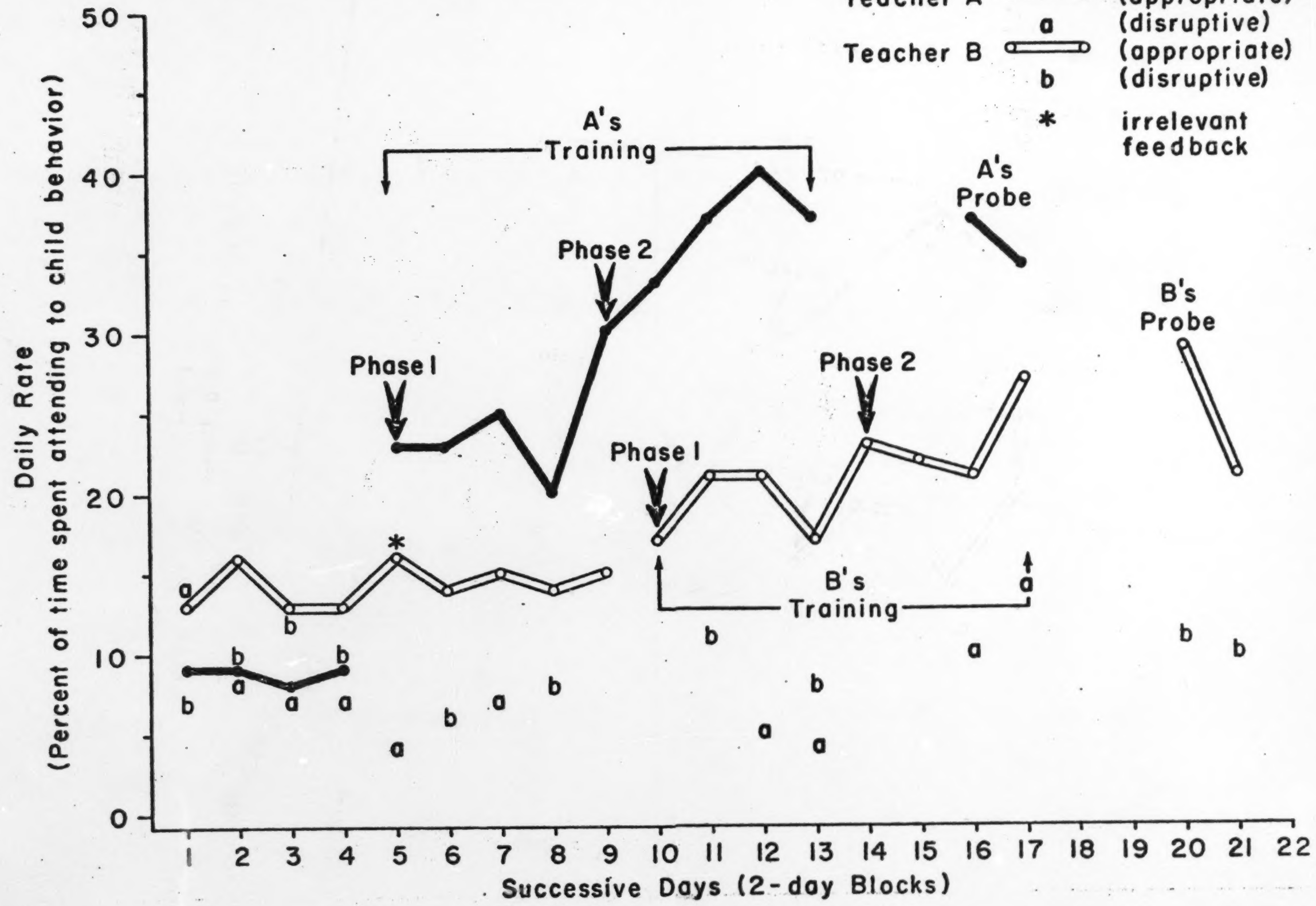
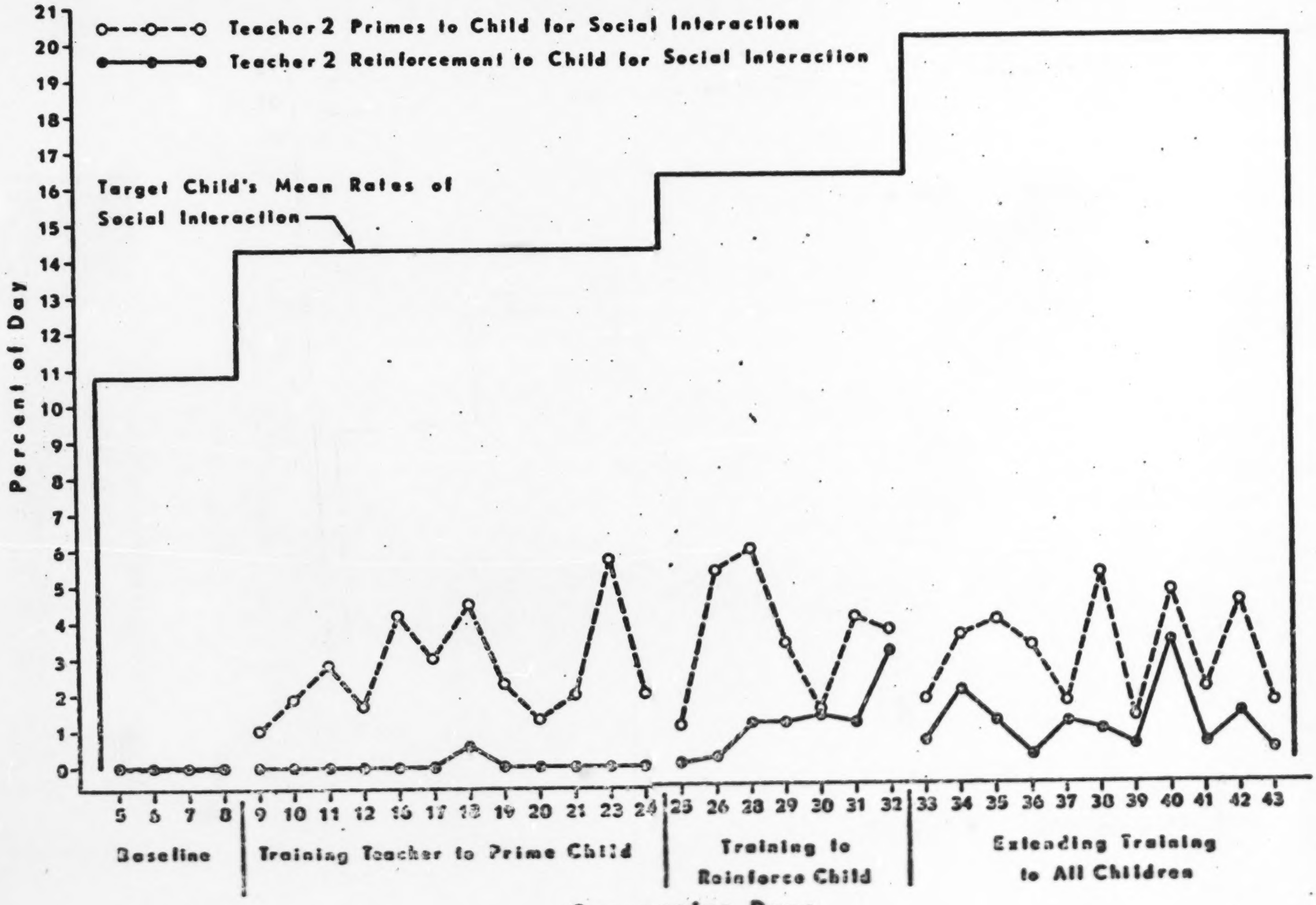
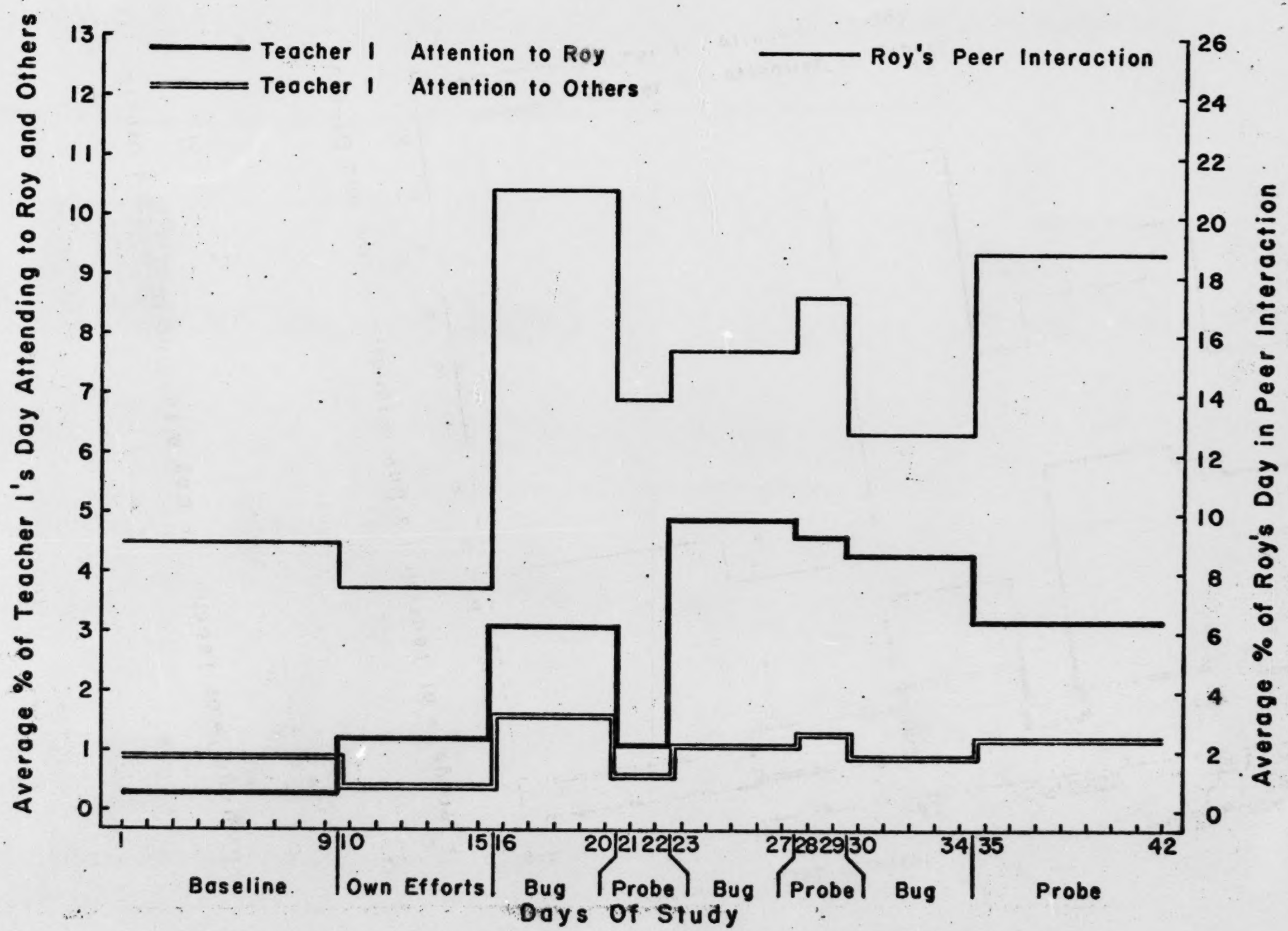

Teacher A (appropriate)
a (disruptive)
Teacher B (appropriate)
b (disruptive)
* irrelevant feedback
A's Training
A's Probe
B's Probe
Phase 1
Phase 2
Phase 1
Phase 2
B's Training
Daily Rate
(Percent of time spent attending to child behavior)
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
Successive Days (2-day Blocks)


Teacher 2 Primes to Child for Social Interaction
Teacher 2 Reinforcement to Child for Social Interaction
Target Child's Mean Rates of Social Interaction
Percent of Day
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
5 6 7 8 9 10 11 12 16 17 18 19 20 21 23 24 25 26 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
Baseline
Training Teacher to Prime Child
Training to Reinforce Child
Extending Training to All Children
Successive Days


Teacher I Attention to Roy
Teacher I Attention to Others
Roy's Peer Interaction
Average % of Teacher I's Day Attending to Roy and Others
Average % of Roy's Day in Peer Interaction
0
1
2
3
4
5
6
7
8
9
10
11
12
13
0
2
4
6
8
10
12
14
16
18
20
22
24
26
1
9
10
15
16
20
21
22
23
27
28
29
30
34
35
42
Baseline
Own Efforts
Bug
Probe
Bug
Probe
Bug
Probe
Days Of Study

Teacher 2

Percent of Day Priming and Reinforcing All Children Except Target Child

Percent of Day Interacting With All Children Except Target Child

Total interaction with all children (except target child).

Primes to all children (except target child) for social interaction

Reinforcement of all children (except target child) for social interaction

Baseline | Training to Prime Child | Training to Reinforce Child | Extending Training to All Children

Successive Days

Appendix A

OBSERVATION OF TEACHER AND CHILD BEHAVIORS FOR TEACHER - TRAINING STUDY

Carolyn L. Thomson and Margaret L. Cooper

One trained observer followed both the teacher and the target child daily. The observer watched the teacher for four minutes, then the target child for four minutes alternately throughout the session: thus, each was observed for a total of one-half of the session. Recordings were made in ten second intervals.

DEFINITIONS

The observer recorded the following teacher behaviors:

1. Teacher-Building

Definition A. Teacher-building may be defined as a teacher's verbal or non-verbal interaction with a child which occurs at a time when the child is not interacting with a peer or peers. In other words the child is not interacting with a peer at the time of the teacher's interaction with that child.

Example: A child is not interacting with a peer. The teacher says something to him and he responds.

Definition B. Teacher-building may be defined as a teacher's verbal prime to a child who is not interacting with a peer or peers (or to a group of children who are not interacting with each other): the prime does not result in a peer interaction within ten seconds after the teacher's prime.

Example: Mary is not interacting with a peer. The teacher primes Mary by saying, "Why don't you ask Jim if you can help him build the house?" Mary, then does not ask Jim (does not interact with him) within ten seconds after the teacher's prime.

2. Peer-Building

Definition A. Peer-building may be defined as a teacher's verbal or non-verbal interaction with a child which occurs at a time when the child is engaged in an interaction with a peer or peers. A child is interacting with a peer at the time

of the teacher's interaction with that child. The "child-child" interaction is antecedent to the "teacher-child" interaction.

Example: Two children are engaged in building a house with blocks (they are interacting). The teacher verbally interacts with one or both of them by saying something or maybe she non-verbally interacts with one or both of them by handing them more blocks.

Definition B. Peer-building may be defined as a teacher's verbal prime to a child who is not interacting with a peer or peers or to a group of children who are not interacting with each other which results in a peer interaction within ten seconds after the teacher's prime. The "teacher-child" interaction is antecedent to the "child-child" interaction.

Example: Mary is not interacting with a peer. The teacher primes Mary by saying, "Why don't you ask Jim if you can help him build the house?" Mary then asks Jim (interacts with him) within ten seconds after the teacher's prime.

3. Prime

A prime may be defined as a teacher's verbalization to a child with the purpose of getting the child to interact either verbally or non-verbally with a peer or with peers. Primes may be obvious or subtle.

Examples of "obvious" primes:

a. "Please pass the milk to Mary after you've poured your own."

b. "Would you like to ride on the teeter-totter with Ann?"

c. "Why don;t you ask Jim if you can help him build the house?"

Examples of "subtle" primes:

a. "I think Mary would like some milk after you've poured your own."

b. "Ann wants someone to ride on the teeter-totter with her."

c. "Maybe Jim needs someone to help him."

A prime is "successful" if the child attempted to interact with a peer or with peers within ten seconds after the teacher primed him. It is considered "unsuccessful" if more than ten seconds pass and the child has made no attempt to interact.

Examples of "successful" primes:

a. Teacher: "Please pass the milk to Mary."

Child: "O.K." (He then passes the milk to Mary.)

b. Teacher: "Ann wants someone to ride on the teeter-totter with her."

Child: "I will." (He then gets on the teeter-totter with Ann.)

c. Teacher: "Why don't you ask Jim if you can help him build the house?"

Child: "O.K." (To Jim:) "Can I help you?" Jim: "No."

Examples of "unsuccessful" primes:

a. Teacher: "I think Mary would like some milk." (The child does not pass the milk to Mary, but simply sets it down in front of himself.)

b. Teacher: "Would you like to ride on the teeter-totter with Ann?"

Child: "No."

c. Teacher: "Maybe Jim needs someone to help him."

Child: "I don't want to."

4. Verbal Interaction

Verbal interaction is defined as spoken initiations or responses to either an adult, a child, or a group.

Examples: "Where's my truck?"

"You be a fireman with us."

"Miss Smith, help me with my coat."

5. Non-verbal interaction

Non-verbal interaction is defined as any physical behavior (movement or direct touch) directed toward an adult, a child, or a group as an initiation or a response.

Examples: Holding hands

Nodding head

Smiling

Handing a block to someone.

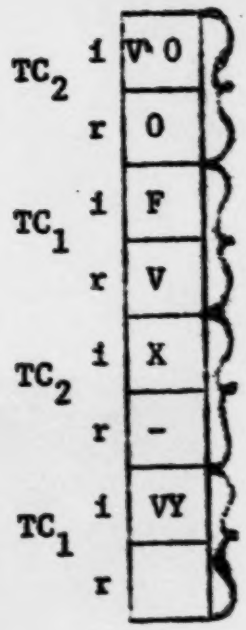
RECORDING

The observer used a twelve minute observation sheet: three four-minute lines. Each minute was divided into six ten-second intervals. Each interval consisted of eight blocks -- four blocks for recording two occurrences of teacher-building behavior and four blocks for recording two occurrences of peer-building behavior.

Recording of Teacher-Building Behavior

The first occurrence of the teacher-building behavior was recorded on TC_1 (teacher to child occurrence 1); the initiation on line (i) and the response, if any, on line (r): the second occurrence on TC_2. The teacher's teacher-building behavior was recorded as either verbal (V), non-verbal (-), or a combination as verbal non-verbal (V-), non-verbal verbal (-V) or a simultaneous occurrence (^). These symbols were used for the teacher's initiation to a child (with the child's letter after the symbol) and for the teacher's response to a child (the child's letter would be placed on the initiation line and the teacher's response on the response line).

Examples:



Teacher verbally and non-verbally initiates to 0: 0 responds.

F initiates to teacher: teacher responds verbally.

X initiates to teacher: teacher responds non-verbally.

Teacher verbally initiates to Y: Y does not respond.

If the teacher-building interaction continues (referred to as a chain), the observer continues to record this interaction until it stops, by recording the child's letter in each interval that he interacts with the teacher and by recording the teacher's interaction using the above symbols.

Examples:

TC_2	i	F	F		F		F is interacting with the teacher in a chain interaction except for interval #3.
	r	-	V	V	V		
TC_1	i	VC	V	-		V	C is interacting with the teacher except for intervals #1 and #4.
	r		C	C	C	C	

Teacher-building rates were calculated as a percent of total teacher output (sum of teacher-building, peer-building, and incomplete interactions).

Recording of Peer-Building Behavior

The first occurrence of the peer-building behavior was recorded on (T) CC_1 (teacher intervention in a child to child interaction occurrence 1); the type of teacher intervention (V, -, V, V, V) on line (t) and the letters of the children who are interacting on line (c): the second occurrence on (T) CC_2.

Examples:

(T)CC_1	t	V	C and D are interacting. Teacher intervenes verbally and non-verbally simultaneously to both C and D.
	c	CD	
(T)CC_2	t	-X	X and Y are interacting. Teacher intervenes non-verbally to X.
	c	XY	

The observer records the letters of any children interacting in the area of the teacher, regardless of the occurrence of the teacher's intervention. The observer records the teacher's intervention in the interval in which it occurred.

Examples:

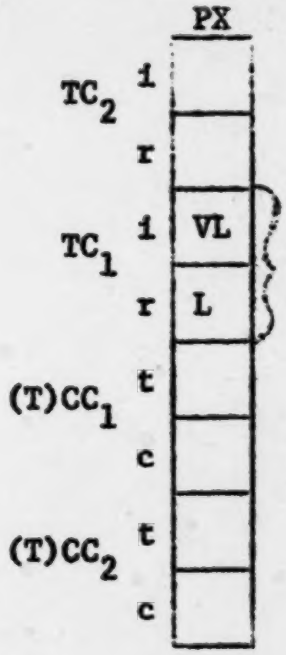
(T)CC_1	t			VF	-X		X and F are interacting for 4 intervals. Teacher intervenes in intervals #3 and #4.
	c	XF					
(T)CC_2	t				-Y		Y and Z are interacting for 4 intervals. Teacher intervenes in interval #3.
	c		YZ				

Peer-building rates were calculated as a percent of total teacher output (sum of teacher-building, peer-building, and incomplete interactions).

Recording of Primes

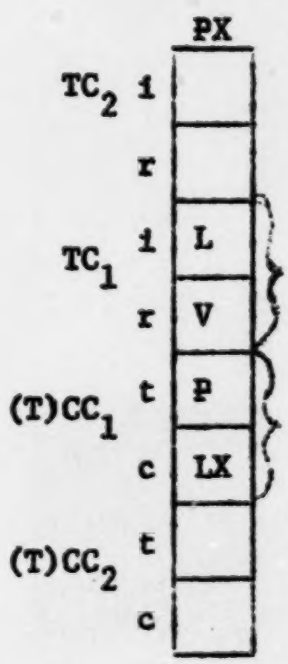
Primes were recorded by means of two symbols: P (unsuccessful prime) and P̄ (successful prime). The symbol (P or P̄) was placed above the eight blocks. The letter of the child who received the prime would be recorded in TC_1 or TC_2. If the prime were unsuccessful the interaction would be recorded as teacher-building only; if the primes were successful, the interaction would be recorded in two places: TC_1 or TC_2 because the teacher was interacting with a child who was not at that time interacting with a peer (teacher-building); and $(T)CC_1$ or $(T)CC_2$ because the child in fact did interact after the prime with a peer (peer-building). The letter of the child to whom he was primed would be recorded after P or P̄.

Example:



Unsuccessful Prime to X

Teacher initiates verbally to L by priming L to interact with X (unsuccessful prime).



Successful Prime to X

L initiates. Teacher responds verbally by priming L to interact with X (successful prime)

P̄ placed here so as to be recorded as peer-building. L and X interact.

Thus, unsuccessful primes are recorded as teacher-building behaviors: successful primes, as both teacher-building behaviors and peer-building behaviors. Priming rates were calculated as a percent of total daily ten second intervals.

Recording of Child Behaviors

The observer recorded the following child behaviors for a selected child.

a. Adult social interaction: target child interacts with an adult.

b. Peer social interaction: target child interacts with a peer.

c. Primes: primes given to the target child to interact with a peer.

Recording of Adult Social Interaction

The observer used the same type of observation sheet that was used for recording teacher behaviors. The lines marked TC_1 and TC_2 were used for adult-target child interactions. The child's interaction was recorded with the beforementioned symbols of V, -, $\not V$, $V^{\wedge}$, $\not V^{\wedge}$. The adult behavior was recorded with the adult's number (1,2,3,. . .)

Examples:

TC_2	i	4	Adult 4 initiates. Child responds non-verbally.
	r	-	
TC_1	i	V2	Child initiates verbally to adult 2. Adult 2 responds.
	r	2	

Adult social interaction rates were calculated as a percent of total daily ten second intervals.

Recording of Peer Social Interaction

Lines $(T)CC_1$ and $(T)CC_2$ were used for recording the target child's interactions with peers. The t line was used for initiations and the c line for responses. The letter of the peer involved was used in the same manner as was the number of the adult in the adult social interaction lines (TC_1 and TC_2).

Examples:

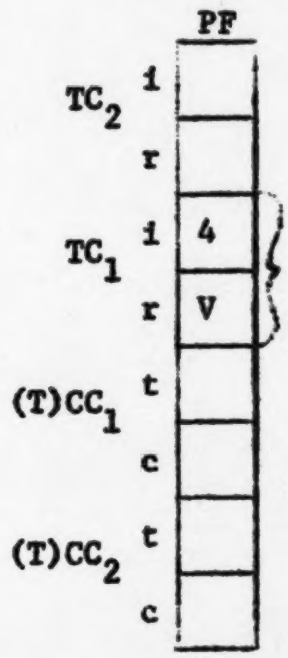
$(T)CC_1$	t	B	Peer B initiates. Target child non-verbally responds.
	c	-	
$(T)CC_2$	t	VF	Target child verbally initiates to peer F. Peer F responds.
	c	F	

Peer social interaction rates were calculated as a percent of total daily ten second intervals.

Recording of Primes

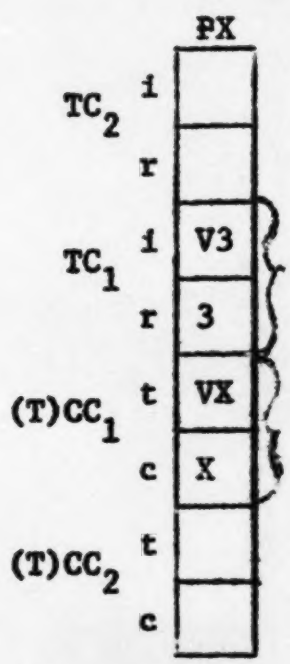
A prime to the target child was recorded by placing a P (unsuccessful prime) or a P (successful prime) above the eight blocks. If the prime was successful, TC_1 or TC_2 would be marked, and either $(T)CC_1$ or $(T)CC_2$ would be marked.

Examples:



Unsuccessful prime

Adult 4 primed target child to interact with F. Target child verbally responded.



Successful prime

Target child verbally initiates to adult 3. Adult 3 responds by priming target child to interact with X.

Target child verbally initiates to X. X responds.

Priming rates were calculated as a percent of total observed intervals.

Examples of recording chains:

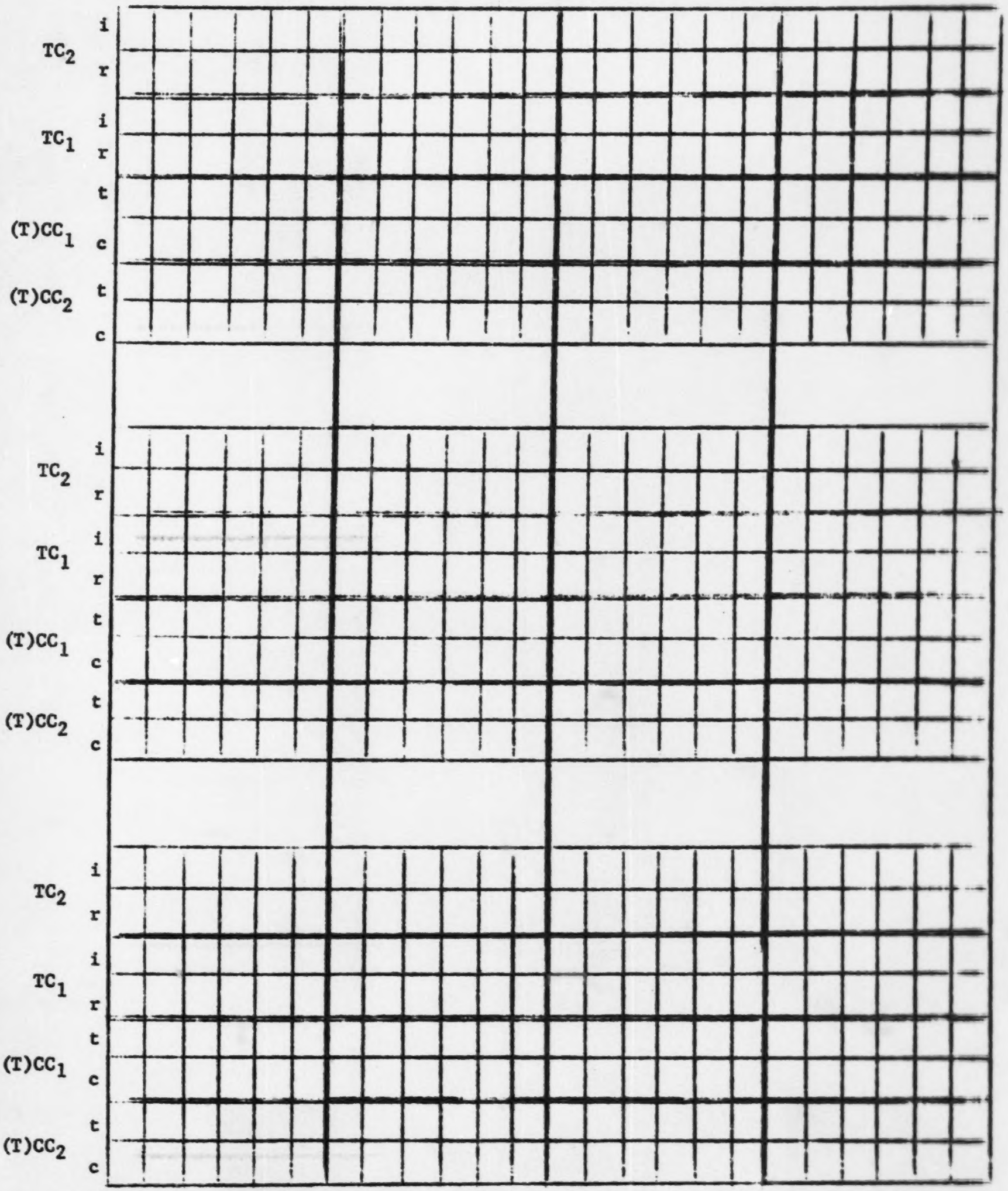
Seconds:		10	10	10	10	10	10	
TC_2	i			3	3	3		Target child interacting with Adult 3
	r			-		^	V	
TC_1	i	V2	V	^	-		^	Target child interacting with Adult 2
	r	2		2	2	2	2	
(T)CC_1	t				VF	V	-	Target child interacting with peer F
	c				F		F	
(T)CC_2	t		VX		V	^	-	Target child interacting with peer X
	c			X	X		X	

Reading the Data Vertically

In the first ten-second interval the target child initiated verbally to Adult 2 who responded. In the second ten-second interval the target child continued to initiate verbally to Adult 2 and also initiated verbally to peer X.

Teacher _____ Day of Study _____

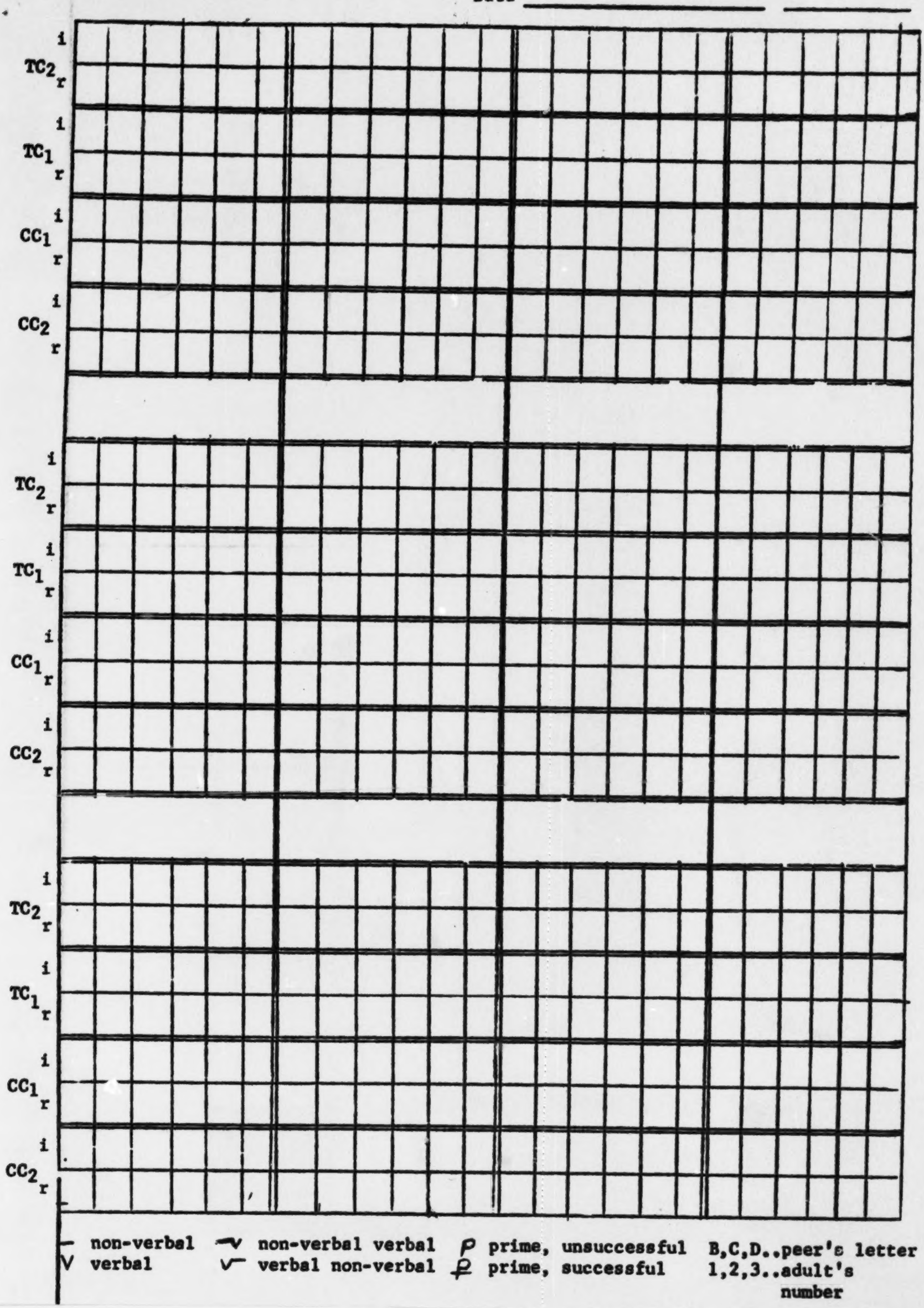
Date _____ Observer _____



\- non-verbal
v verbal
-v non-verbal verbal
v- verbal non-verbal
p prime, unsuccessful
p prime, successful
B, C, D,..child's letter
BCD, EFH,..peer interaction

Child _____ Day of Study _____ Observer _____

Date _____



— non-verbal —v non-verbal verbal ρ prime, unsuccessful B,C,D..peer's letter

V verbal v— verbal non-verbal ρ prime, successful 1,2,3..adult's number